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FOREST INSECT INFESTATIONS

IN THE LAKE TAHOE REGION

by

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FOREST INSECT INFESTATIONS IN THE LAKE TAHOE REGION

For the past several years the dying of coniferous trees has been the cause of much concern on the part of landowners in the Lake Tahoe region, where the forests are valued mainly as cover for summer home lots and for aesthetic reasons. Property values rather than timber values are affected by the present conditions, where insects and disease are killing a very noticeable number of trees. These conditions became conspicuously worse during the season of 1929, especially in white fir. The season of 1930 has shown little evidence upon which to expect improvement. As a result of numerous inquiries from interested owners the writer made a brief inspection, during August 1930, of the areas bordering Lake Tahoe, in company with Forest Pathologist Willis Wagener, who has prepared a report covering the plant diseases involved in this situation. The present report is based upon observations made during this inspection and upon occasional trips through the area during the past five seasons.

INSECTS RESPONSIBLE FOR TREE KILLING

Two distinct types of insect infestations are involved in this recent killing of conifers around Lake Tahoe. One of these types is represented by the killing of pines (yellow pine, lodgepole, sugar pine and Jeffrey pine) by bark beetles (Dendroctonus); the other type is the topkilling or entire death of white fir trees, due to the attacks of the fir engraver beetle (Scolytus ventralis Lec.). These two types of insect damage must be considered separately, both as to origin and treatment, as pines are not attacked by those insects which kill fir, and vice versa.

Insect Infestations in Pine Forests

Lodgepole pine south of Lake Tahoe in the vicinity of Myers is dying from an epidemic of the mountain pine beetle (Dendroctonus monticolae Hopk.) which has been in progress for several years. More than 25 per cent of the trees have been killed on some of these areas. This epidemic, however, does not affect to any extent the properties along the lake shore.

Sugar pine is being killed to a very limited extent by the same species of bark beetle. This condition is more noticeable where there has been recent road construction or other activities where trees are liable to be scarred.

Jeffrey pine is also dying from the attack of a similar bark beetle (Dendroctonus jeffreyi Hopk.). While this infestation cannot be classed as epidemic, the loss of occasional trees which is occurring on valuable lots is of considerable importance to the owners. In the young-growth stands on the Nevada side of the lake east of Glenbrook, group killing of Jeffrey pine was observed which may indicate an incipient outbreak of this insect.

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In all species of pines the red turpentine beetle attacks around or near the base of trees, causing conspicuous pitch masses on the outer bark, which come from large wounds made by the adult beetles in the cambium. This bark beetle is often attracted to trees where buildings of pine lumber are under construction, and where cutting and clearing of trees on lots is under way. For this reason it is quite noticeable around areas where there is much building activity. This beetle, however, does not ordinarily develop tree-killing propensities, and it can be considered of secondary importance in the present situation. It can be controlled by injecting carbon bisulphide into the wounds made by the adults or by cutting away the bark which covers their burrows with an axe or chisel, in order to expose and kill the adults and broods.

Complete information regarding all the pine-killing insects will be found in Bulletin No. 7, issued by the California State Board of Forestry--"Insect Enemies of California Pines and Their Control", by F.P. Keen. This bulletin also contains a copy of the State Act (3704) dealing with forest pests, under which owners may if they desire organize a district for a control campaign on a community basis. The control of pine beetle infestations can be carried out independently of conditions in the firs, which are not attacked by these insects.

Insect Infestations in White Fir and Red Fir

The other forest insect problem, aside from pine beetles, involves much heavier losses of trees. This is the infestation of the fir engraver beetle in white fir, which is killing great numbers of the younger trees throughout the area. Red fir, which grows at higher elevations, is also attacked by the same insect. The infestation of the fir engraver is not localized in any one part of the Tahoe region, but is distributed everywhere that fir is found. Some localities, however, have sustained heavier losses than others. The killing of trees during the 1929 season was especially heavy along the west shore of the lake, from Tahoe Tavern to Meeks Bay. Noticeable killing also occurred on the slopes surrounding Fallen Leaf Lake.

The injury to the tree is first caused by tiny transverse tunnels cut by the adult beetles between the bark and wood, both on the main bole and larger limbs. The cambium for several inches above and below this channel soon dies, apparently as the result of a fungus introduced by the beetle. Eggs are deposited along these channels and the larvae feed in the dead inner bark until they mature, then transform into adults of the new generation of beetles. Development of the brood requires the entire summer season, and only one generation is produced annually.

The smaller trees usually die as the result of one or two seasons of attack by the fir engraver beetle. The tops of the larger trees are killed in the same manner as the smaller trees. If the attack is extended down the maintrunk of a large tree during the course of two or three seasons, the entire tree dies. A cerambycid borer (*Tetropium abietis* Fall) often supplements the attack of the engraver and hastens the killing of large trees. Occasionally trees are but partially attacked, and continue to live for years with dead tops. Where the cambium is but partially killed by the fir engraver in living trees, new growth will rapidly cover the dead patches where the beetles attack, and scars become imbedded in the wood of the main trunk. Evidence of very old attacks may therefore be found in the trunks of trees still living.

In some localities around Lake Tahoe a tree-killing fungus is associated with the fir engraver beetle, but these two agencies are capable of working independently, and their association in the same tree is apparently merely incidental. A description of the work of this fungus is included in Pathologist Wagener's report.

Very old scars found on both dead and living trees indicate that the fir engraver beetle has been at work in this area for an indefinite period. The amount of damage, however, has increased noticeably since 1924, and was apparently heavier in 1929 than at any time during the recent history of the region. Groups of from 15 to 40 trees of pole size and larger were killed by the attacks of 1929, and were conspicuous on the slopes and around the lake shore during the 1930 season. The number of large firs which were killed also increased during the 1929 season. The extent of attacks which occurred during 1930 cannot be definitely determined until next spring. The foliage of trees killed by 1930 attacks had not turned color sufficiently to be detected in August; but enough new attacks were found to indicate that the trouble is still aggressive and shows little sign of decreasing.

Control measures which have been suggested for the fir engraver beetle have not been tried out on any adequate scale in this or any other region. Obviously broods of the insect within the infested trees can be destroyed during the fall and winter periods by cutting the trees and burning the infested bark, or during the late spring and summer periods by trimming and exposing the logs to the hot sun. The volume of infestation can be reduced by these methods in proportion to the thoroughness of the work and extent of the area covered. As the adult beetles may fly for a considerable distance, the work would have to be carried out as a community project over a very large area to be effective. The use of chemicals on the bark, either to kill the broods in infested trees or to repel the beetles from individual trees that have not been attacked, can only be tried out experimentally before they can be recommended. The use of chemical repellents would be so expensive that they could be applied only by individual lot owners to protect especially valuable trees. Such measures could have little effect in relieving the present epidemic situation throughout the area. There is obvious need for a detailed study of the entomological and pathological factors involved in the present situation in white fir, and for experimentation with control measures.

SUGGESTIONS REGARDING CONTROL

Measures to control the bark beetle infestations which are killing pines will not involve new or untried remedies. These methods are described in detail in the state bulletin already referred to in this report. Both private and federal timberland owners have employed these methods on a considerable scale within the state for the protection of commercial timber holdings. The values attached to the forest cover on recreational areas is apparently high enough to warrant the cost of control measures under conditions like those in the Tahoe region. It is necessary, however, that the work be conducted over a very large area if it is to be effective. This would involve a community project where a large number of small ownerships are involved.

If the owners desire to initiate a control campaign, the first step would be a preliminary survey to determine the approximate amount of infested timber within the area to be protected, the possibility of defining an infestation district in which control can be carried on with reasonable expectation of success, and an estimate of the number of infested trees according to ownership. Such a survey is necessary as a basis upon which to plan, organize and estimate the cost of bark beetle control projects. If the survey is authorized by the State Forester, the owners within the State of California may then proceed with eradication measures under the provisions of the state law.

Similar steps will apply if control of the fir engraver beetle is also to be undertaken along with the eradication of pine bark beetles. It seems essential, however, that more information should be secured regarding the complex problem presented by the insects and plant diseases which are killing white fir. A research program covering both entomological and pathological factors should proceed or at least be carried on simultaneously with any attempt at eradication of either insects or diseases. Funds are not available in the Bureau of Entomology to advance adequately either the preliminary entomological survey or the research program.

RECOMMENDATIONS

At least two measures appear to be outstanding if any steps are taken by the land owners toward control of these infestations:

1. A survey of the region during the 1934 season to determine the approximate amount and ownership of infested timber, both pine and fir;
2. Further study of the insects and plant diseases affecting white fir, with the particular object of developing and improving control methods. A research program of this kind can be advanced to the best advantage if the entomological and pathological aspects are considered concurrently.